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EB 180E-1**HESSE-EASTERN**A DIVISION OF  
FLIGHTEX FABRICS INC.  
EVERETT, MASS.6**REPORT NO. 1 & 2-61-50G-111**  
**MONTHLY PROGRESS REPORT**ENGINEERING PROGRAM FOR  
THE PILOT PRODUCTION OF A  
LIGHTWEIGHT ANTITANK WEAPON**FOR THE PERIOD**MONTHS OF JANUARY AND FEBRUARY 1961**CONTRACT NO. RD-142****ORDNANCE PROJECT NO.****DEPT. OF ARMY PROJECT NO.**JOB NO. 78-03642ABOX NO. 8FOLDER NO. 6TOTAL DOCS HEREIN 43498

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HESSE - EASTERN DIVISION

FLIGHTEX FABRICS, INC.

PROGRESS REPORT #9

ENGINEERING PROGRAM FOR THE PILOT PRODUCTION OF

A LIGHTWEIGHT ANTITANK ROCKET

JANUARY AND FEBRUARY 1961

CONTRACT NO. RD-142

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WORK ACCOMPLISHED DURING THE MONTH OF JANUARY AND FEBRUARY 1961

SYSTEM EVALUATION PROGRAM

The pilot production was completed during the reporting period. All Batches have been tested, accepted and canned. The only problem remaining is the procurement of additional wooden boxes for shipment. Since the need for additional boxes was not anticipated, this will cause a minor delay of one week in the date at which all systems can be picked up. All items will be boxed and ready for shipment after March 29th 1961.

During Quality Control Testing, some problems in the fuze area were uncovered on batch No. 5. The problem was completely solved after conducting additional tests with ten more rounds than called for in the Specification. A lot of 196 rounds which had been produced in this batch prior to the acceptance tests, were color coded with two red rectangles in each end cap. The remainder of batch 5 was coded with white rectangles. Only the red coded items will be subject to possible fuze malfunctions, all systems assembled after the testing and after remedial action will function as well or better than previous batches. Functioning on batch 6 was 100%.

This report will show the results of Quality Control Tests for Batch 4 (January 4, 1961) Batch 5 (January 26, 1961, this batch consists of 250 units ready for delivery after testing,) and batch 6 (February 7, 1961 also 250 units after testing).

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PILOT PRODUCTIONQUALITY CONTROL TEST JANUARY 4, 1961 (BATCH 4)

<u>Round No.</u>	<u>Test Per T-310</u>	<u>Aim</u>	<u>Hit</u>	<u>Armor Penetration (inches)</u>	<u>Comment</u>
1	B3 Water	3-15	2-13	10.000	
2	B3 Water	6-15	4-16	7.500	
3	B3 Water	9-15	8-15	8.750	
4	B3 Water	12-15	11-16	12.500	
5	B4 Humidity	15-15	16-16	10.000	
6	B4 Humidity	18-15	15½-14	12.750	
7	B4 Humidity	18-21	20-20	12.500	
8	B4 Humidity	15-21	12½-20	11.250	
9	B1 Hot	6-21	7½-20	11.750	
10	B1 Hot	3-21	1½-21	10.000	
11	B1 Hot	15-21	11-19	6.250	
12	B1 Hot	15-27	14-26	10.000	
13	B2 Cold	6-27	8-27	6.250	
14	B2 Cold	3-27	*		Functioned
15	B2 Cold	9-27	7-27	3.750	
16	B2 Cold	12-27	13-26	7.750	
17	B5 Graze				Missed Target - (Dud)
18	B5 Graze				Functioned
19	B5 Graze				Functioned
Total				141.000	
Average				9.475	

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As may be seen from the tabulation, all rounds functioned with the exception of one graze round which missed the target and failed to function. This round missed the oblique target at which it was aimed and hit some bushes, experiencing very gradual and gentle deceleration. An additional graze round was fired, which functioned. The possibility of missing the graze target is rather large since the target is only 48" long and presents only a few inches of lateral target at the angle of obliquity which is used in these tests.

As a result of this test the project officer accepted this batch and all units were canned.

**BATCH NO. 5**

Production of the next batch was immediately resumed. It was decided to increase the last two batches by 50 systems in order to avoid an extra run of 100 systems at the end of the project. The testing of the batch was started somewhat sooner than on previous occasions because this batch was the first one which was not produced with the continual participation of the project engineer. This was done quite deliberately for two reasons:

A. In order to find whether this slackening of supervision, which would be normal for production conditions, would show any deficiencies in the procedure as established.

B. In order to save funds.

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The following is a tabulation of the test results of the acceptance tests with Batch 5:

PILOT PRODUCTIONQUALITY CONTROL TEST 1-26-61 - 2-8-61

<u>Round No.</u>	<u>Test Per T-310</u>	<u>Aim</u>	<u>Hit</u>	<u>Armor Penetration (Inches)</u>	<u>Comment</u>
1	B4 Humidity	15-27	14-25	11.00	
2	B4 Humidity	18-27	20-25	8.50	
3	B4 Humidity	18-21	22-21		Dud-Fuze could not be found
4	B4 Humidity	15-21	16-17	12.50	
5	B4 Humidity	12-21	10-19	7.50	
6	B3 Water	6-27	6-27		Dud-Bulge Around Det. Hole Kept Rotor from Arming Fully
7	B3 Water	6-27	7-24	8.75	
8	B3 Water	3-27	5-25	10.00	
9	B3 Water	9-27	8-28	7.50	
10	B3 Water	12-27	12-24	12.50	
11	Ambient (72°F)	6-21	9-17	6.25 ---	
12	Ambient (72°F)	6-21	10-21	8.75 ---	Extra rounds added for evaluation purposes
13	Ambient (72°F)	3-21	7-22	10.25 ---	
14	Ambient (72°F)	3-21	4-18	5.00 ---	
15	Ambient (72°F)	12-21	15-19½	7.50 ---	
16	Ambient (72°F)	Not Aimed	None		Functioned
17	Ambient (72°F)	Not Aimed	None		Functioned

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<u>Round No.</u>	<u>Test Per T-310</u>	<u>Aim</u>	<u>Hit</u>	<u>Armor Penetration (Inches)</u>	<u>Comment</u>
18	Ambient (72°F)	Not Aimed	None		Functioned
19	Ambient (72°F)	Not Aimed	None		Dud-Laminac between fuze & Barrel
20	Ambient (72°F)	Not Aimed	None		Dud-Bulge in rotor
21	B2 Cold	15-21	14-22	6.25	
22	B2 Cold	18-21			Missed target - went thru 6" Armor Plate Upright
23	B2 Cold	18-15	18-15	8.50	
24	B2 Cold	15-15	15-15	9.75	
25	B2 Cold	9-15	9-15	8.50	
26	B1 Hot	12-15	12-17		Dud-Exrayed 2/3/61 (Laminac between Fuze & Barrier)
27	B1 Hot	12-15	12-14	7.50	
28	B1 Hot	9-15	9-18	10.00	
29	B1 Hot	6-15	12-12	8.50	
30	B1 Hot	6-15	10-15	11.00	
31	B5 Graze				Functioned
32	B5 Graze				Functioned
33	B5 Graze				Functioned
Total Average				186.00 8.857"	

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Rounds 11 through 29 were added in the course of the testing since rounds 3 and 6 were duds. This was done in order to check out the evaluation of the cause of the duds.

All the duds, with the exception of Round 3, the fuze of which could not be found, were disassembled and the cause of the failure to function was determined beyond any doubt.

It was found that Round No. 6 was almost fully armed with the triggering components properly set back and with the firing pin released, however, the rotor had not turned fully with the result that the firing pin hit the very edge of the detonator. Close examination of the parts revealed that a small bulge at the forward end of the rotor had prevented full arming. The front face of the fuze housing abuts against a .005" steel washer, which separates the fuze from the explosive components. This washer is forced against the face of the fuze housing by set-back when the round is being fired. The position and contour of the rotor is carefully controlled to insure clearance between the rotor and the steel washer.

The bulge was caused by a dull counterboring tool which had pushed the thin wall between the end of the detonator cavity and the outside of the rotor outward.

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It was then decided to fire 10 rounds eight of which would have rotors which had been carefully checked and any bulges removed. Two of the rounds (#19 and 20) had bulges. All fuzes not assembled into rounds were examined and it was discovered that the last lot of rotors received from the machine shop showed bulges in 15% of the rotors. It should be noted that the bulge was not large enough to cause malfunction in every case, however, it was clearly established by the impression left by the bulge on the steel washer that this had been the cause of the malfunction on Round 6.

Steps were taken to remove all bulges on the remaining rotors.

The ten rounds were fired on 2/3/61. Both rounds with bulges in the rotors failed to function. Investigation however, revealed that Round No. 19 had malfunctioned for a different reason.

In the case of this round, it was found that the safety pins had not released. When the assembly was taken apart, it became evident that the fuze had not been able to abut against the motor barrier, as intended because of a lump of Laminac Cement on the motor threads. Since this condition was hard to explain, a careful check on the assembly procedures used for this batch was made. It was found that step No. 1 of the assembly procedure had been done in advance for the next day and the assembled motors were left laying on their side. A small pool of Laminac

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Cement was found on a number of motors in this condition. Should such a motor be assembled before the cement can hardened, this condition would have no effect on fuze function. The amount of cement in the small pool being too small to do more than cover part of the safety sleeve. If, on the other hand, the cement is allowed to set, the small pool formed on one side of the motor thread, where it abuts against the motor barrier, would make it impossible for the safety sleeve to move all the way back, thus obstructing the safety pin in a manner which would make release impossible. Again this would not take place in every case, but the possibility of it happening would be present.

The decision was now made to finish the acceptance test and to examine any further duds. If it should prove that the number of duds is small and if the cause for any failure to function would be clearly either the bulge in the rotor or the laminac, the remaining systems would be assembled in a manner which would avoid these conditions. Careful adherence to the assembly procedure will make the trouble with the cement a virtual impossibility. Better quality control of components would obviate trouble with the rotor. The trouble with the rotor was probably caused by the fact that this was getting toward the end of the run and that the operator failed to notice the trouble or did not think it worth while to have his counterboring tool sharpened.

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The test was than continued and one more dud (Round 21) was encountered. Examination showed that this too had been caused by the Laminac Cement.

The decision was than made by the Project Officer, that the 196 systems which were left over in the batch after the testing, should be color coded after canning. The remainder of the systems should be assembled using the above mentioned precautions against re-occurrence of the two troubles. The rounds for checking out the last batch and one quarter were to be assembled immediately after this and tested. If this test proceeded with no duds, the last batch was to be carefully assembled.

This decision was carried out and Batch 6 was checked out on February 7th.

PILOT PRODUCTIONQUALITY CONTROL TEST 2/7/61

<u>Round No.</u>	<u>Test Per T-310</u>	<u>Aim</u>	<u>Hit</u>	<u>Armor Penetration (Inches)</u>	<u>Comment</u>
1	B3 Water	6-15	6-14	7 1/2	
2	B3 Water	9-15	9-13	6 1/4	
3	B3 Water	12-15	12-14	8 1/2	
4	B3 Water	15-15	15-14	11 1/2	
5	B3 Water	18-15	19-13	8 3/4	
6	B4 Humidity	6-9	9-7	7 1/2	
7	B4 Humidity	5-9	5-4	8 1/2	
8	B4 Humidity	9-12	11-10	10	

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<u>Round No.</u>	<u>Test</u> <u>Per T-310</u>	<u>Aim</u>	<u>Hit</u>	<u>Armor Penetration</u> <u>(Inches)</u>	<u>Comment</u>
9	B4 Humidity	12-12	13-9	11 3/4	
10	B4 Humidity	15-15	17-9	5	
11	B1 Hot	6-18	7-13	6 1/4	
12	B1 Hot	9-18	7-13	8 1/2	
13	B1 Hot	12-18	16-13	9 3/4	
14	B1 Hot	15-21	14-22	11 1/4	
15	B1 Hot	18-21	19-20	7 1/4	
16	B2 Cold	12-21	10-22	7 1/2	
17	B2 Cold	8-12	9-21	8 1/2	
18	B2 Cold	9-21	6-21	9 1/2	
19	B2 Cold	9-27	9-23	8 3/4	
20	B2 Cold	12-27	13-28	6 1/4	
21	B5 Graze				Functioned
22	B5 Graze				Functioned
23	B4 Graze				Functioned
Total Penetration				168 3/4	

divided by Number of rounds (20) - Average penetration 8.437".

The results of this test were reported to the Project Officer and instructions were received to proceed with the remaining assembly and canning.

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This was done and all systems which had to be produced under this contract have either been picked up or are awaiting pick up at this time.

A minor hitch occurred in that the boxes for transporting the systems, four at a time per truck or plane, were not returned to the J-2 Range and it transpired that this could not be done as originally agreed upon. New boxes were ordered and it is expected that the units will be available for pick up during the week starting March 27, 1961.

The remaining activities on this project will consist in the preparation of a final report, the policing of both the J-2 Range area and of the area in Everett for classified items and the proper disposal of left-over components and tooling. No further monthly reports will be prepared since there are no further matters of technical interest to report. The drawings and specifications will be checked and disposed off in accordance with instructions from the Project Officer.

A summation of all test results during the pilot production will be found in the final report.

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